Spatial Price Analysis of Pepper in Ezza South Local Government Area, Ebonyi State, Nigeria

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Abstract:

The study analysed the spatial price of pepper in Ezza South Local Government Area of Ebonyi State. Data were collected using structured questionnaires administered on 120 pepper marketers randomly selected from the 4 markets locations in the Local Government Area. Data collected were analyzed using simple regression, gross margin and factor analysis. The result of the analysis showed that there exists spatiality in the prices of pepper in the area. And that market locations, cost of transportation, availability of storage facilities, density of pepper buyers, market organization, and individual price fixing are the major factors influencing spatial price of pepper. The coefficient of multiple determination (R^2) 0.768, showed that about 77% of the total variations in the quantity of pepper sold was explained by spatial price of pepper in the area. Despite the spatiality of prices in the markets the coefficients of elasticity in each of the market locations were elastic; implying that, in every ₦1 increase in the price of pepper will result in a unit increase in the quantity of pepper marketed. However, the individual market analysis shows that marketing of pepper is most profitable in "Eke Imoha" market. However, the study recommended the provision of marketing infrastructures such as good roads to enhance accessibility of the markets and easy delivery of pepper to the point of demand.

ey: Spartial price, Pepper, Marketers, Market Location, Elastic

Introduction

Agricultural commodity prices vary between locations and markets. This is a pure natural phenomenon. Price variation is necessary for the existence of a market, as it creates the incentives that attract market players to engage in trade. Spatial price analysis is an important area of discuss in the structure of markets (Ravallion, 1986). Thus, it is not the spatial differences in prices *per se* that should be of concern to the policy makers, but rather excessive variability and, in some cases, *no or little* variability of staple food prices across space. The need for spatial analysis arises because agricultural commodities are bulky and perishable, their production is seasonal, and production and consumption points are spatially dispersed. As a result, the transportation of a commodity from one market to another is costly and requires special efforts

(Sexton *et al*, 1991). Spatial price analysis involves the study of spatial markets in which the concept of pricing efficiency is distinguished from the concept of market integration. The pricing efficiency is the price-based notion of equilibrium, whereas the market integration is the flow-based indicator of tradability (Barrett, 2001). According to Ojo (1998), the plausible underlying factors of the price spatiality in Nigeria can be categorized into global, regional and national factors. Therefore, analyzing the channels of pepper distribution and the functioning of the pepper markets is an important issue. Many economically important commodities are costly to transport and the spatial aspects of markets for such commodities cannot be ignored. Spatial patterns of marketing give rise to a complex web of relationships among prices throughout a market.

Spatial price analysts attempt to study price behavior in order to gain insight into the workings of the market and to test whether it is performing well (Fackler, 1996). The study however, analyzed specifically the factors that influence spatiality in price of pepper in the area; determined the marketing costs and returns of the product marketed at spatial market locations; determined the effect of spatial price on the quantity sold for the agricultural product; and determined the price elasticity's of pepper in the defined market location

Methodology

The study area is Ezza South Local Government Area of Ebonyi State. The area is made up of four (4) major markets to include "Eke-Imoha" market, "Oriegbe" market, "Nkwuda-Ezza" market, and "Nwaffia-Ogu" market, . According to (NPC, 2006), Ezza south has a population of 133,625 people and the total land mass 324 square kilometers. From the four (4) major markets, thirty (30) pepper marketers were randomly selected to give a sample size of one hundred and twenty (120) respondents. Primary data were collected using structured questionnaires. Data collected were analyzed using both descriptive and inferential statistics.

Model Specification:

Factor analysis model;

$Y_i = \alpha_{i0} + \alpha_{i1}F_1 + \alpha_{i2}F_2 + \alpha_{i3}F_3 + \alpha_{i4}F_4 + \alpha_{i5}F_5 + \alpha_{i6}F_6 + \cdots\cdots + \alpha_{in}F_n + e_i$

Where, α_i = Parameters or Loadings. Thus, $\alpha_1 - \alpha_n$ is the loading of variable Y_i on factors F_n.

Simple regression model;

$Y = f(x)$…………………..Implicit Form

$Y = a_0 + a_1x_1$…………… Explicit non stochastic

$Y = a_0 + a_1x_1 + et$…….. Explicit stochastic

Where: Y= Quantity sold in Kg x_1 = Spatial prices

α_0 = constant

α_1 = regression coefficient

et = Stochastic error term.

Coefficient of Elasticity;

$Ei = \dfrac{\%\blacktriangle Q}{\%\blacktriangle P}$, Where: Ei = Coefficient of Elasticity, $\%\blacktriangle Q$ = percentage change in quantity demanded of pepper, $\%\blacktriangle P$ = percentage change in price of pepper

Gross margin model;

Gm = TR – TVC

Profit (π) = Gm – TC

TC = TVC + TFC

Benefit-Cost-Ratio (BCR) = TR/TVC

Where: Gm = Gross margin, TR = total revenue

Result Discussion

From table 1, factor analysis was used to analyze the factors influencing spatial price of pepper in the area. The purpose was to analyze the factors and then interpret variables that load high using Kaiser (1950)'s rule of thumb in which variables with coefficient of ≥ 0.3 were identified as having strong influence. Result of the analysis shows that infrastructural factors influencing spatial price of pepper are; the cost of transportation, availability of storage facilities. Again, the economic factors that influenced spatial price of pepper are; the number of pepper buyers, market organisation, and individual price fixing. This finding corroborates Girapunthong *et al.* (2003) who posited that market boundaries covered by each trader are generally narrow, as a result of a number of factors contribute to market separation. This can be attributed to the occurrence of temporal and spatial

frictions resulting from high transport costs, primarily because of poor roads and road networks. Secondly, the inadequate price information about other markets can result to poor information transmission channels, inefficient communication systems and absence of official (government) price communication/media (Nigerian Institute of Social and Economic Research (NISER), 2001). The third factor is the incidence of individualized price formation processes resulting from haggling. This can be attributable to lack of product homogeneity and standardized units of measurement. Finally, the presence of market associations may limit the market access of poor rural farmers who may be discriminated against by the capital rich wholesaler. The majority of farmers and retailers have poor access to credit, which may reduce their ability to respond to price changes.

From table 2, the result of simple regression analysis shows that the coefficient of multiple determination (R^2) was 0.768 which indicates that about 77% in the total variations in dependent variable (quantity of pepper sold) was influenced by the independent variable (spatial price) in the area. The coefficient of spatiality of price was positively related to the quantity of pepper sold in the area, signifying that every one unit increase in spatial price in the price of pepper will bring about an increase in the quantity of pepper sold in the area.

Table 3 shows that price of pepper vary significantly at different markets in Ezza South Local Government Area of Ebonyi State. This was justified as a bag of 50kg of pepper was sold at ₦4800 ₦5000, ₦4800, and ₦5400 in "Eke-Imoha", "Orie-egbe", "Nkwuda Ezza" and "Nwafia-Ogu" Markets. However, despite the spatiality of prices in the markets the

coefficients of elasticity in each of the market locations were elastic; thus implying that in every ₦1 increase in the price of pepper will result into a unit increase in the quantity of pepper marketed in the area. This finding was attributed to the fact that farmers are very sensitive to the market forces as they will normally prefer to sell their products at the time when there will be an upward increase in price so as to create incentive for their product.

Profitability measure of pepper as seen in table 3, was determined using gross margin analysis. In each of the spatial markets, 100 bags of 50kg bags of pepper were used as yardstick. From the analysis, it was observed that in "Eke-Imoha", the total variable cost was ₦709,000.00, total fixed cost was ₦14,600 and the profit was ₦956,400.00. A Benefit Cost Ratio (BCR) analysis shows 1: 2.32. Implying that in every ₦1 spent in marketing pepper in the area, a profit of ₦1.32k was realised as return to investment. In "Nkwuda Ezza", the total variable cost was ₦537,000.00, total fixed cost was ₦14,600 and the profit was ₦1,148,400.00. A Benefit Cost Ratio (BCR) analysis shows 1: 3.08. Signifying that in every ₦1 spent in marketing pepper, a profit of ₦2.08 was realised as return to investment. In "Orie-Egbe", the total variable cost was N516,000.00, total fixed cost was ₦14,400 and the profit was ₦1,419,600.00. The cost benefit ratio indicates 1: 3.17. This implies that in every ₦1 spent in marketing pepper in the area, a profit of ₦2.17 was realised as return to investment. In "Nwaffia-Ogu", the total variable cost was ₦506,000.00, total fixed cost ₦13,600 and the profit was ₦1,480,400.00. A Benefit Cost Ratio (BCR) analysis

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shows 1: 3.21. This implies that in every ₦1 spent in marketing pepper in the area, a profit of ₦2.21k was realised as return to investment. Consequent upon the general profitability of pepper marketing in the area, the individual market analysis shows that marketing of pepper is most profitable in "Eke-Imoha". This findings was in-line with that of Fackler, (1996), who maintained that return to investment is a function of rate of turn-over in business enterprises.

Conclusion

The spatiality in the price of pepper has been found to be elastic and positively related to the quantity of pepper marketed in the study area. However, the study recommended the provision of marketing infrastructures such as good roads to enhance easy delivery of pepper to the point of demand. Again, government market agency should provide and enforce the use of a standard unit of measure to enhance uniformity in the price of pepper in the area.

Reference

Anderson, K. (2009). Distortions to Agricultural Incentives: A Global Perspective, 1955 –2007 Washington, DC: Palgrave MacMillan and The World Bank. 5 (10), 63-68

Barrett, C. B. (2001). Measuring Integration and Efficiency in International Agricultural Markets. American Journal of Agricultural Economics. 23: 19-32

Fackler, P. L. (1996). "Spatial Price Analysis: A Methodological Review." Proceedings of the NCR-134 Conference on Applied Commodity Price Analysis, Forecasting, and Market Risk Management. Chicago, IL. [http://www.farmdoc.uiuc.edu/nccc 134].

Girapunthong, N. VanSickle, J. J. and Renwick, A. (2003) Price Asymmetry in the United States Fresh Tomato Market. Journal of Food Distribution Research. 34 (3): 51-9.

Nigerian Institute of Social and Economic Research (NISER). (2001). .Price and Trade Incentives in Nigerian Crop, Livestock, Fisheries and Forestry Production. Final Research Report Submitted by the Agriculture and Rural Development Department of NISER to the Federal Ministry of Agriculture and Rural Development and the World Bank, Abuja. March.2002.

National Population Commission (NPC), (2006). Census Figure of Ebonyi North Zone of Ebonyi State, Nigeria.

Ojo, M.O. (1998). Some implications of Government Economics Policies for the Financing and Development of Agriculture in nigeria. Central Bank of Nigeria Publication, Ibadan. Pp. 16-24.

Ravillion, M. (1986). Testing Market Integration. American Journal of Agricultural Economics. 68: 102-109.

Sexton, R. J. Kling, C. L. and Carman, H. H. (1991). Market Integration, Efficiency of Arbitrage, and Imperfect Competition: Methodology and application to U. S. Celery. American Journal of Agricultural Economics 72: 568-580.

Table 1: Varimax Related Component Factor on Factors influencing Spatial Price of Pepper marketing in Ezza South Local Government Area

Variables	Factor I Infrastructural Constraints	Factor II Economic Constraints
Transportation	0.775	0.32
Number of Buyers	-0.143	0.799
Market information	0.193	0.193
Storage Facility	0.732	-0.048
Market Organization	-0.181	0.356
Good Policy	-0.110	0.642
Individual Price fixing	0.323	0.690

Source: Field Survey, 2017

Table 2: Simple Regression Results of the effect of Spatial Price on the Quantity of Pepper Sold in Ezza South Local Government Area

Variables	Coefficients	Std Error	t-value
Constant	-11.676	22.166	-0.527
Spatial Price	0.007	0.008	0.900
R^2	0.768		
D.W	1.354		
F-Statistics	0.89		

Source: Computed From Field Data, 2017

Table 3: Price Elasticity of Pepper Marketing in Ezza South Local Government Area

Markets	Priceof Pepper/50kg/Naira	Coefficient of Elasticity	Remark
"Eke-Imoha" Market	4,800	1.25	Elastic
"Orie-egbe" Market	5,000	2.5	Elastic
Nkwuda Ezza Market	4,800	1.43	Elastic
Nwafia-Ogu Market	5,400	1.45	Elastic

Source: Field computation, 2017

Table 4: Costs and Returns of Pepper Marketing in Ezza South Local Government Area

Variables	"Eke-Imoha"	"Nkwuda-Ezza"	"Orie-Egbe"	"Nwafia-Ogu"
Total variable cost(TVC)	709,000	537,000	516,000	506,000
Total fixed cost(TFC)	14,600	14,600	14,400	13,600
Total Revenue(TR)	1,680,000	1,700,000	1,950,000	2,000,000
Gross margin = TR-TVC	971,000	1,163,000	1,434,000	1494,000
Profit = TR – TFC	956,400	1,148,000	1,419,600	1,480,400
BCR = TR /TVC	1:2.32	1:3.08	1:3.17	1:3.21
Return to investment	1.32	2.08	2.17	2.21

Source: Field survey, 2017